

## Balancing Equations Tips and Guidelines

### Balancing Equations - 4 Levels of Difficulty

Level 1 - Given the skeleton equation, balance with coefficients (e.g. Sheet 18).

Level 2 - Given the word equation, write the formulas, and then balance (e.g. back of Sheet 18).

Level 3 - Given the reaction (all reactants and products) in sentence form, set up the equation, write the formulas, and then balance (e.g. Sheet 19).

Level 4 - Given only part of the reaction (usually only the reactants), set up the equation, predict the products, and then balance (e.g. Sheet 25).

### Balancing Equations - A Few Guidelines/Suggestions

1. Work from left to right (balance the atoms/ions as you come to them).
2. When you change a coefficient to balance one atom/ion in a formula, balance the other atom/ion in that formula next.
3. If a polyatomic ion stays intact on both sides of the equation, balance it as a single unit.
4. If the same element appears in more than one reactant, or more than one product, try to leave it to last.
5. When you are done, double-check to make sure your coefficients are in lowest ratio.

Notes:

1. When water is a reactant, be sure to write it as HOH, rather than H<sub>2</sub>O.  
e.g.  $2\text{Na} + \text{H}_2\text{O} \rightarrow \text{Na}_2\text{O} + \text{H}_2$  (WRONG! – this is not what happens)  
 $2\text{Na} + 2\text{HOH} \rightarrow 2\text{NaOH} + \text{H}_2$  (RIGHT!)
2. When choosing whether to write the formula for water as H<sub>2</sub>O or HOH, look on the other side of the equation – if the OH ion is there, write as HOH to make it easy to balance the OH's on both sides.
3. Whenever a hydrocarbon (C<sub>x</sub>H<sub>y</sub>) or carbohydrate (C<sub>x</sub>H<sub>y</sub>O<sub>z</sub>) burns, the products of the combustion are ALWAYS carbon dioxide and water (CO<sub>2(g)</sub> + H<sub>2</sub>O<sub>(g)</sub>).
4. If states of matter are required (s,l,g,aq), pay attention to the wording of the question, and note the following: water solution is (aq), all ionic compounds are solids (s), unless dissolved in water; for molecular compounds, use your empirical knowledge (e.g. methane is a gas, alcohols are liquids, etc.).